INTELLIGENT INSTRUMENTATION®

INNOVATIVE PC Data Acquisition Solutions

UDAS-1001E Series Visual Designer Support Library User Manual

for the

Multifunction Data Acquisition System

A Burr-Brown Company BB®

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UDAS-1001E Series User Manual
Revision History

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Chapter 1 Introduction to the Visual Designer Blocks

1.1 About this Manual

The UDAS Visual Designer Support Library function blocks are used to interface and operate the UDAS-1001E Series Data Acquisition System units. This chapter provides instructions for installing the UDAS Support Library software (after the Visual Designer software installation), includes a reference for the UDAS Support Library files, and provides Technical Support information.

The contents of this manual include:

Chapter 1 Includes an introduction to this manual, software installation instructions for the UDAS Visual Designer Support Library, an installation file list, technical support information, and preliminary notes and topics for using all of the Visual Designer UDAS function blocks.

Chapter 2 Describes the UDAS analog input function blocks (**uAnalogInput**, **uAnalogInputHS**, **uThermocoupleConversion**). These blocks control the analog input hardware on UDAS units and temperature conversion of thermocouple data.

Chapter 3 Describes the UDAS analog output function blocks (**uAnalogOutput** and **uAnalogOutputHS**). These blocks control the analog output hardware on UDAS units.

Chapter 4 Describes the UDAS counter input function block (**uCounter**). This block counts external events or measures the frequency or period of an external signal on UDAS units.

Chapter 5 Describes the UDAS digital input port and input bit function blocks (**uDigitalInput**, **uDigitalInputBit**). These blocks control the digital input functions on UDAS units.

Chapter 6 Describes the UDAS digital output port block (**uDigitalOutput**). This block controls the digital output functions on UDAS units.

1.2 Software Installation

This section provides instructions for installing the UDAS Support Library. Install Visual Designer 4.0 or later before installing the UDAS Support Library. Refer to the Visual Designer User's Manual for installation instructions for the Visual Designer software. After installing the Visual Designer software, continue with this section.

1.2.1 Installing the UDAS Visual Designer Support Library

The UDAS-1001E Data Acquisition System CD shipped with the UDAS unit contains the UDAS Visual Designer Support Library.

To install the UDAS Visual Designer Support Library:

1. Prior to installing the UDAS Visual Designer Support Library, verify the Visual Designer\Run and Visual Designer\Diagram are not running on the system.
2. Insert the UDAS-1001E Data Acquisition System CD in the CD ROM drive. Steps 3 and 4 provide two methods of installing the software.
3. Run the **SETUP.EXE** program located on the UDAS-1001E Data Acquisition System CD. From the Windows 98 desktop, click *Start*, select *Run* and type:

   <use your CD drive letter>: \DESIGNER\SETUP.EXE <ENTER>
4. Or, in Windows Explorer select the CD ROM drive and double-click the **SETUP.EXE** program file. Verify this program file is located in the **DESIGNER** sub-directory.
5. Follow the software installation instructions in the dialogs. To stop the installation press the *ESC* key or click *Cancel*.

> **Note:** When the program prompt asks for a directory location for the installation, select the directory where the Visual Designer software is installed. Installing the UDAS support blocks in a subdirectory of this location enables the Visual Designer program to access the blocks. The installation program provides a default location that is the same as the Visual Designer default installation directory.

6. The installation program asks for the Start menu Program Folder where various shortcuts for the **UDASRDME.TXT** file and other files associated with the UDAS Support Library will be installed.

> **Note:** Using the Visual Designer program folder for the UDAS Support Library is recommended. The installation program provides a default location that is the same as the Visual Designer default installation directory.

7. After all of the files have been installed, exit the install program.

Accessing the UDAS Function Blocks

To access the UDAS Function Blocks, use the USB submenu of the Visual Designer's Blocks menu.

1.3 UDAS Support Library File Reference

This section provides a list containing the name, purpose, and directory location of each UDAS Support Library file after the installation has been completed.

C:\DESIGNER\USB subdirectory

UAI.DLL	uAnalogInput block
UAIH.DLL	uAnalogInputHS block
UAO.DLL	uAnalogOutput block
UAOH.DLL	uAnalogOutputHS block
UCT.DLL	uCounter block
UDI.DLL	uDigitalInput block
UDBIT.DLL	uDigitalInputBit block
UDO.DLL	uDigitalOutput block
UTP.DLL	uThermocoupleConversion block

C:\DESIGNER directory

I3USB.DLL	UDAS support library
GUSB.DLL	UDAS unit selection utility
UAI.CNT	on-line help table of contents for the uAnalogInput block
UAIHS.CNT	on-line help table of contents for the uAnalogInputHS block
UAO.CNT	on-line help table of contents for the uAnalogOutput block
UAOHS.CNT	on-line help table of contents for the uAnalogOutputHS block
UCT.CNT	on-line help table of contents for the uCounter block
UDI.CNT	on-line help table of contents for the uDigitalInput block
UDIB.CNT	on-line help table of contents for the uDigitalInputBit block
UDO.CNT	on-line help table of contents for the uDigitalOutput block
UTP.CNT	on-line help table of contents for the uThermocoupleConversion block
GUSB.HLP	on-line help table of contents for the UDAS unit selection utility
UAI.HLP	on-line help table of contents for the uAnalogInput block
UAIHS.HLP	on-line help table of contents for the uAnalogInputHS block
UAO.HLP	on-line help table of contents for the uAnalogOutput block
UAOHS.HLP	on-line help table of contents for the uAnalogOutputHS block
UCT.HLP	on-line help table of contents for the uCounter block
UDI.HLP	on-line help table of contents for the uDigitalInput block
UDIB.HLP	on-line help table of contents for the uDigitalInputBit block
UDO.HLP	on-line help table of contents for the uDigitalOutput block
UTP.HLP	on-line help table of contents for the uThermocoupleConversion block
UDASERR.TXT	error codes specific to the UDAS support library
UDASRDME.TXT	important information about the UDAS support library

1.4 Technical Support

Technical support via telephone, fax, and electronic communications is available to Visual Designer users.

Technical Support links on Intelligent Instrumentation's web site (*http://www.instrument.com*) contain the most current support information and contact addresses.

1.5 Block Function Parameters

This section includes parameters common to all UDAS Visual Designer block functions:

- Assignment of user-specified names to particular UDAS units
- Selection of the UDAS units to be used by a given block function

> **Note:** In the Parameters dialog for each UDAS Support Library block, the field labeled *USB* contains the list of configured UDAS units. Items in the list may be edited by clicking the *Edit USB Names* button to open the UDAS Devices dialog.

1.5.1 Assigning and Editing Descriptive UDAS Names

A unique serial number identifies each UDAS unit. A descriptive name can be assigned to each UDAS unit and edited by using each UDAS Support Library block's Parameters dialog.

Example: Using a Text Name to Describe a UDAS Unit

If one UDAS unit is being used to monitor a boiler and another UDAS unit is being used to monitor an air handler, the first unit could be named Boiler, and the second unit could be named AirHandler.

1.5.1.1 Assigning a UDAS Unit Name

1. With the Visual Designer/ Diagram program running, in the File menu click *New* to open a new diagram.
2. In the Blocks menu, click *USB* to open the submenu containing the UDAS block functions, and select the desired block.

   An icon of the block appears in the diagram.
3. Double-click the icon and the block's Parameters dialog opens.

4. Click the *Edit USB Names* button to open the UDAS Devices dialog shown in FIGURE 1.1, *UDAS Devices dialog*.
5. In the UDAS Devices dialog, in the *Name* field, type the desired name of the UDAS unit. Do not use spaces between the characters for the UDAS unit Name.
6. In the *Serial Number* field, type the serial number for the UDAS unit.
7. To add a new name and serial number to the list of units, click the *New* button.
8. Replace the highlighted name and serial number with the name and serial number of the new unit.

> **Note:** When a unit is selected in the list, any changes made in the *Name* and *Serial Number* fields are immediately updated.

9. When finished with this dialog, click the *OK* button to save the settings in the computer registry and close the dialog.

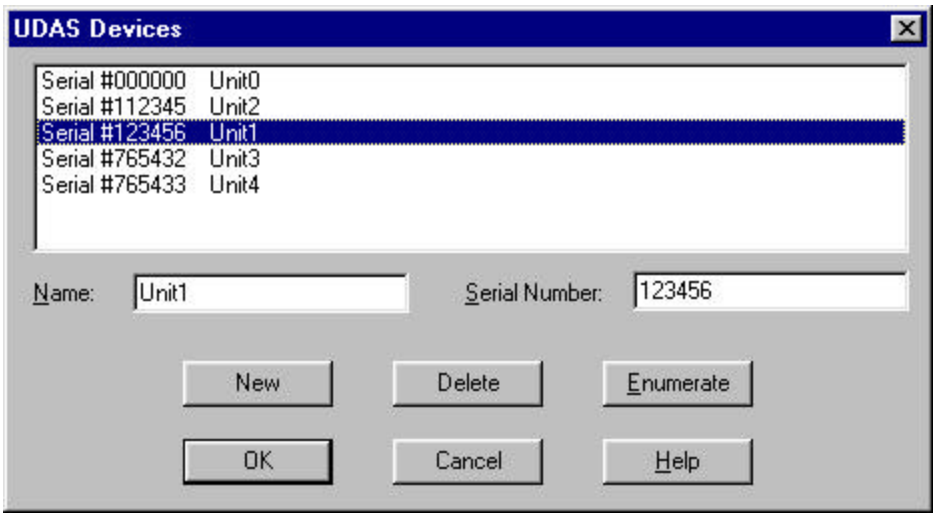

FIGURE 1.1 UDAS Devices dialog

1.5.1.2 Editing an Existing UDAS Unit Name or Serial Number

1. In the UDAS Devices Dialog, select the UDAS unit from the list.
2. Make the changes in the *Name* and *Serial Number* fields. Click the *OK* button to save the settings in the computer registry.

1.5.1.3 Deleting a UDAS Unit from the UDAS Devices Dialog

1. In the UDAS Devices dialog, select the item to be deleted from the list.
2. Click the *Delete* button.
3. Click the *OK* button to save the settings in the computer registry.

   The registry on the local computer is used to translate the unit name to be used by a block into the UDAS unit's serial number.

1.5.1.4 Scanning the USB Bus for UDAS Units

Use the Enumerate feature to scan the USB bus for UDAS units.

1. Click the *Enumerate* button. If a list of devices is present, the existing list is cleared. Any currently connected UDAS units automatically appear in the UDAS Devices dialog.

   Each UDAS unit's serial number automatically appears in the *Serial Number* field.
2. Click the *OK* button to save the settings into the computer registry and close the dialog.

> **Note:** The Enumerate option is not functional if SYSCHECK, Visual Designer, or any other program is currently using a UDAS unit.

1.5.2 UDAS Support Library Blocks: Selecting a UDAS Unit

Each UDAS Support Library block operates by using one UDAS unit. The unit to be used by a block is selected in the block's *Parameter* dialog as shown in FIGURE 1.2, *uAnalogInput Parameters dialog*.

To select a UDAS Unit for a UDAS Support Library Block:

1. In the Blocks menu, click *USB* to open the submenu containing the block functions, and select the desired block.

   An icon of the block appears in the diagram.
2. Double-click the icon and the block's Parameters dialog opens.

3. In the *USB* field, click the down arrow and select the unit to be used with this block.
4. Choose the settings in the *Channels*, *Buffer*, *Pacer*, and *Trigger* Parameter fields.
5. Make your choices in the *Acquisition Mode* field, then click the *OK* button to save the settings and close the dialog.

> **Note:** In the *USB* field, *Default* always appears in the list of available UDAS units. This indicates to the block that it should use the first unit that is located, allowing a Visual Designer application to be used on a computer without configuring the UDAS units. When writing a general application that can be used on more than one computer and uses one UDAS unit, leave the unit in each block's dialog set to Default.

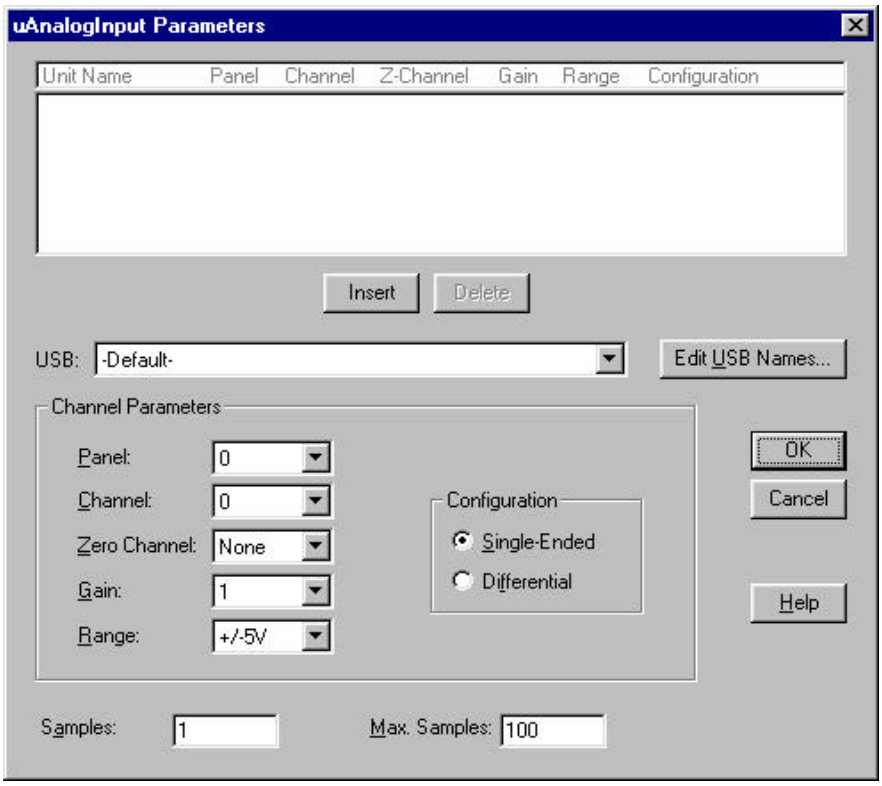

FIGURE 1.2 uAnalogInput Parameters dialog

Chapter 2 UDAS Analog Input Function Blocks

2.1 Introduction

This chapter describes the Visual Designer UDAS analog input function blocks. These UDAS function blocks support software controlled analog input, high-speed analog input, and conversion of thermocouple temperature data. This chapter contains detailed descriptions of these blocks.

Block Name	Icon	Function Description
uAnalogInput	uAnalogInput 1	Acquires analog input data from a UDAS unit under software control.
uAnalogInputHS	uAnalogInputHS 1	Acquires high-speed analog input data from a UDAS unit using high-speed sampling techniques.
uThermocoupleConversion	uThermocoupleConversion 1	Converts analog input data acquired using either the uAnalogInput or uAnalogInputHS block into temperature values, based on the type of thermocouple being read.

TABLE 2.1 UDAS Analog Input Block Descriptions

Each function block included in this chapter has its own Parameters dialog which provides information on the block's operation, inputs, outputs, and parameters.

2.2 uAnalogInput Block

2.2.1 Description

The Visual Designer UDAS **uAnalogInput** block reads analog input data from the specified UDAS unit under software control. Use the Parameter dialog for this block shown in FIGURE 2.1, *uAnalogInput Parameters dialog* to create a list of analog input channels to read.

When the block executes, a selected number of samples from each channel in the channel list are read from the selected hardware and output by the block. If more than one channel is read, use the Visual Designer **Unpack** block (Blocks menu/Convert sub-menu) to separate the data for each channel.

The **uAnalogInput** block has one optional input and three outputs described below.

Inputs: Optional Inputs

UnitName

This string input provides an optional method of selecting a UDAS unit that is used to acquire the data, after a list of units has been set up using the block's UDAS Devices dialog.

If this input is connected, it overrides the *USB* field parameter in the *uAnalogInput Parameter* dialog.

Outputs

VoltsData

This output contains the parameter-specified number of readings from each channel in the block's channel list with the values converted to volts. The data type for each dimension or channel of the VoltsData buffer is Floating Point.

CountsData

This output contains a selected number of readings from each channel in common-format counts. The meaning of these values depends on the A/D's input voltage range.

The data type for each dimension, or channel, of the CountsData buffer is Integer for *bipolar input range* channels (for example: ±10 V), and Unsigned Integer for *unipolar input range* channels (for example: 0-10 V).

Status

The Status output is a single-dimension, Long Integer data buffer that represents the status of the block. The status bits are set using any combination of the following:

The letter **h** represents hexidecimal notation. The letter **d** represents decimal notation.

USB_LINK (80000000h / -2147483648d) indicates the UDAS unit is open and operating correctly.

USB_ADDRESS_INVALID (00000002h / 2d) indicates the unit name specified in the uAnalogInput block's parameter dialog or through the UnitName input is unknown. The name was not entered in the UDAS Devices dialog.

USB_OPEN_FAILURE (00000001h / 1d) indicates that opening the unit failed. If an application is trying to use a UDAS unit already in use by another application, this error may occur. Only one application may have a UDAS unit open at a time.

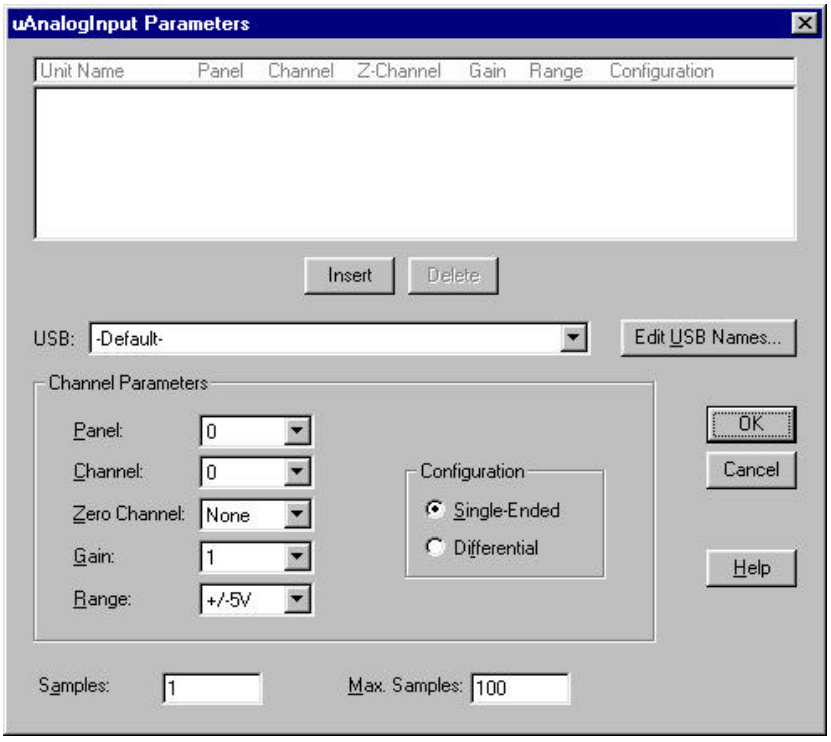

FIGURE 2.1 uAnalogInput Parameters dialog

2.2.2 Parameters

The upper section of the *uAnalogInput Parameter* dialog shown in FIGURE 2.1, *uAnalogInput Parameters dialog* displays the list of channels to be read. This is referred to as the Channel List.

Use the *Insert* and *Delete* buttons to Insert and Delete items in the Channel List. Select a specific panel, channel, zero channel, gain, range, and configuration for each item in the list. If one of the channel parameters is changed, the list item is automatically updated to reflect the change. This dialog also enables you to select the number of samples to be taken from each channel in the list on each iteration through the diagram.

Selecting Channel Parameters

Options in the Channel Parameters portion of the dialog can be selected from the drop-down lists for Panel, Channel, Zero Channel, Gain, and Range. The Configuration field contains radio buttons for selecting Single-Ended or Differential configuration.

The USB list selects the attached UDAS unit that will be used by the block. The channel list displays the channels on the UDAS unit to be read, and the configurations for each unit.

To specify the number of samples to be acquired from each channel in the list on each iteration through the diagram, use the *Samples* field (located at the lower left-hand area of the dialog).

The *Max. Samples* field represents the maximum number of samples. This value must be greater than or equal to the value in the *Samples* field.

Parameters

Channel List

Located in the upper section of the dialog, this list contains the inserted channels for the selected UDAS unit. Use the *Insert* and *Delete* buttons to add and remove list items.

The parameters for each channel list item can be changed by using the options described below. For the Visual Designer FlowGram to compile and function properly, there must be at least one defined channel in the list.

Insert

To add a new item to the channel list, click the *Insert* button. The new item is inserted below the currently selected item (highlighted) in the channel list.

The channel parameters for the new item are the same as the parameters for the currently selected item in the list.

The channel number automatically increments by one each time a new item is added to the channel list. If the item that is currently selected represents the last channel on the selected panel, the next panel is selected for the new entry and the channel number is reset to zero.

Delete

To remove the selected item from the channel list, click the *Delete* button.

USB

This field contains a drop-down list that displays the names of the UDAS units assigned to them by serial number in the UDAS Devices dialog.

Edit USB Names

To assign a name to a UDAS unit, click this button to open the UDAS Devices dialog and enter the name and serial number of the UDAS unit.

Channel Parameters

The parameters for each selected item can be set by using the drop-down lists for the Panel, Channel, Zero Channel, Gain, and Range.

Click the configuration radio buttons to select either the Single-Ended or Differential setting. Descriptions of each of the parameters are provided below.

Panel

This is the termination panel number in an AI-MAX system. To change the panel number of the channel list item that is selected, click the down arrow to open the drop-down list and select one of the panel numbers.

> Note: If you are not using AI-MAX, set the panel to zero.

Refer to your hardware manual for proper cabling and termination of the analog input signals.

Channel

Use this field to change the channel number of the selected (highlighted) item in the channel list. Click the down arrow to open the drop-down list, which displays all of the analog input channels on the selected UDAS unit for the selected configuration, and make your selection.

For systems using AI-MAX channel expansion, the channel number is relative to the selected panel number. Channel 0 is the first channel on the selected panel.

Refer to your hardware manual for proper cabling and termination of the analog input signals.

Zero Channel

A zero channel is used to eliminate any A/D converter offset from a channel measurement.

This occurs by taking a reading from the zero channel (connected to ground), and subtracting the result (the offset) from the readings taken from the actual channel. This effectively removes converter offset from the readings.

To select a zero channel for the reading from the corresponding channel, click the down arrow to open the drop-down list.

> Note: The zero channel is always on the same panel as the primary channel.

Gain

To select a suitable gain for the analog input signal that you want to read, click the down arrow to open the drop-down list and make a selection.

Range

To select a range for the analog signal that you want to read, click the down arrow to open the drop-down list and make a selection.

Configuration

Click the radio button to select either the *Single-Ended* or *Differential* configuration for the analog input signals that you want to read. Refer to the hardware manual for the proper cabling and termination of the analog input signals.

Samples/Max. Samples Parameters

The **uAnalogInput** block provides a *Samples* field, where you enter the number of samples to be read from each channel in the list each time the block executes.

This feature is useful for collecting 50 to 100 samples from thermocouple channels to increase the accuracy of the readings or to allow averaging of input signal values.

The value in the *Max. Samples* field must be greater than or equal to the value in the *Samples* field.

Remarks

Displaying Actual Counts Data

To display the raw counts data acquired by the **uAnalogInput** block (using a Visual Designer Display block), pass the *CountsData* output of the block through a **Type Conversion** block and enable the *Strip weights and offsets* option of the **Type Conversion** block. Otherwise, the **Display** block applies the weight and offset to the counts data, and voltage is displayed instead of counts.

To change the units of the CountsData output from volts to another unit of measure (the units after the weight and offset are applied), pass the counts data through a **Modify Units** block.

2.3 uAnalogInputHS Block

2.3.1 Description

The Visual Designer **uAnalogInputHS** block reads analog input data from the specified UDAS unit using high-speed (HS) analog input techniques.

The **uAnalogInputHS** block has six optional inputs and four outputs that are described below.

Inputs: Optional Inputs

UnitName

Offers an optional method of selecting a unit to be used to acquire the data, provided that a list of units has been set up through the block's UDAS Devices dialog.

When this input is connected, it overrides the USB field parameter in the block's dialog.

Sample Rate

Use this Floating Point input to specify the per-channel sample rate in Hertz. When this input is connected, the SampleRate input overrides the Sample Rate parameter in the *uAnalogInputHS Parameters* dialog.

Output Samples

Use this Unsigned Long input to specify the output buffer size in samples per channel.

If connected, the OutputSamples input overrides the Samples Returned Each Cycle parameter in the uAnalogInputHS block parameter dialog.

PostTriggerSamples

Use this Unsigned Long input to specify the number of post-trigger samples to be collected by the block when it is operating in trigger mode.

> Note: If the block is not operating in trigger mode, the input is ignored. If the block is in trigger mode and the input is connected, the PostTriggerSamples input overrides the Post-trigger Samples parameter in the uAnalogInputHS Parameters dialog.

TriggerVoltage

Use this Floating Point input to specify the trigger voltage value when the block is configured for trigger mode and the analog input trigger is selected as the source of the trigger. If the block is not operating in trigger mode, or another trigger source is specified, the input is ignored. If the block is in trigger mode and configured for analog input trigger, and the input is connected, the TriggerVoltage input overrides the TriggerVoltage parameter in the *uAnalogInputHS Parameters* dialog.

FallingEdgeTrigger

To specify a rising trigger or a falling trigger signal to activate the high-speed analog input process, use this Boolean input. For the block configured for analog input trigger, setting the FallingEdgeTrigger input to FALSE causes a positive transition of the analog input value past the trigger voltage to trigger the process.

Setting the FallingEdgeTrigger input to TRUE causes a negative transition of the analog input value past the trigger voltage to trigger the process. When the block is configured for an *external trigger*, setting the FallingEdgeTrigger input to FALSE causes a $0 \rightarrow 1$ transition to trigger the process. A TRUE value in the input buffer causes a $1 \rightarrow 0$ transition to trigger.

> Note: If the block is not in trigger mode, the input value is ignored.

Outputs

VoltsData

This multi-dimension output contains the user-specified number of samples (Output Samples), from each channel, converted to volts. Floating Point is the data type for each dimension, or channel, of the VoltsData buffer.

CountsData

This is a multi-dimension output that contains the user-specified number of readings (Output Samples), from each channel, in common-format counts. The meaning of these values depends on the A/D's input voltage range. The data type for each dimension, or channel, of the CountsData buffer is Integer for bipolar input range channels (for example: ±10 V), and Unsigned Integer for unipolar input range channels (for example: 0-10 V).

Status

The Status output is a single-dimension, Long Integer data buffer that represents the status of the block.

The letter **h** represents hexidecimal notation. The letter **d** represents decimal notation.

The status bits may be set by using any combination of the following:

- USB_LINK (80000000h / -2147483648d) indicates the UDAS unit is open and operating correctly.
- USB_ADDRESS_INVALID (00000002h / 2d) indicates the unit name specified in the **uAnalogInputHS** block's parameter dialog or through the UnitName input is unknown. The name was not entered in the UDAS Devices dialog.
- USB_OPEN_FAILURE (00000001h / 1d) indicates that opening the unit failed. This error occurs if an application is trying to use a UDAS unit already in use by another block. Only one application may have a single UDAS unit open at a time.

Overrun

The Overrun output is a Boolean type of buffer that has a length of one.

When TRUE, it indicates that a high-speed data acquisition process was unable to keep up with the selected sample rate, and that data has been lost.

This is an indication that either the sample rate needs to be lowered, or there is other USB bus traffic interfering with the acquisition process. The Overrun output is not latched. It indicates whether an overrun occurred in the current data buffer output by the **uAnalogInputHS** block.

2.3.2 Parameters

Use the *uAnalogInputHS Parameters* dialog to select the analog input channels to read, the timing and trigger source to use, the acquisition rate, and the number of samples to return. If more than one channel is read, use the **Unpack** block to separate the data for each channel. To view the parameters for this block, see FIGURE 2.2, *uAnalogInputHS Parameters dialog.*

This dialog contains the following fields:

- a drop-down list of the UDAS units
- parameters to select the channels to read
- fields to select values for the gain and range
- configuration field to select the type of input configuration

- pacer source and sample rate
- trigger source, channel, and voltage
- slope (rising edge or falling edge)
- buffer parameters

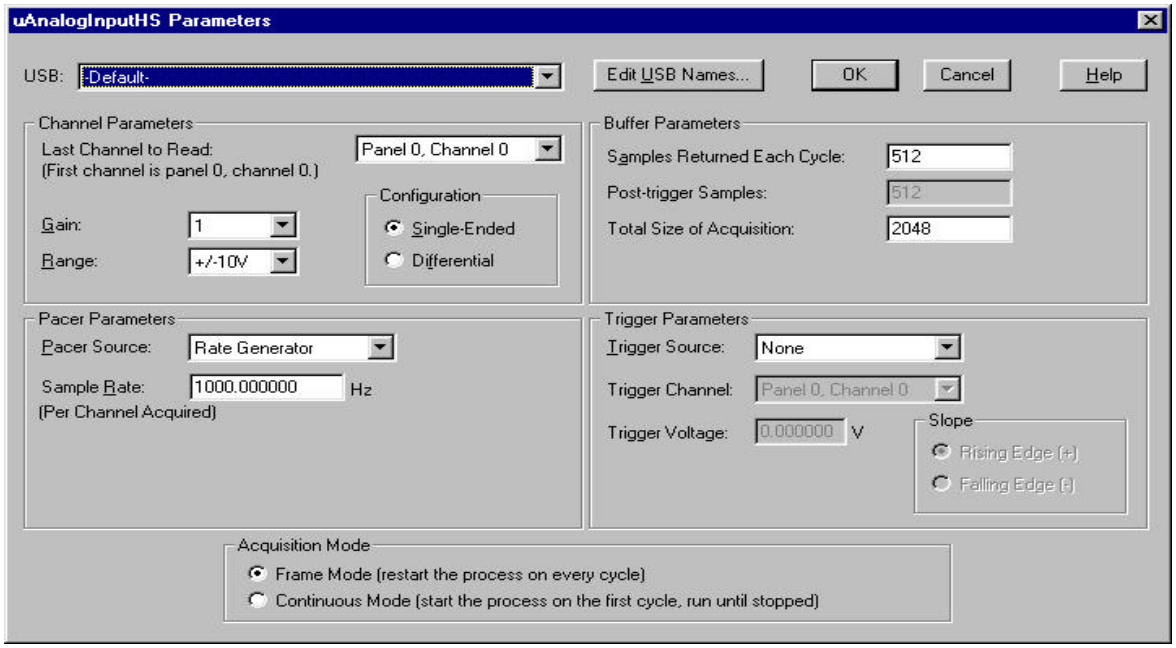

FIGURE 2.2 uAnalogInputHS Parameters dialog

USB

This field contains a drop-down list that displays the names of the UDAS units that were assigned to them in the UDAS Devices dialog.

Edit USB Names

Clicking on the *Edit USB Names* button displays the UDAS Devices dialog where you can enter a name for a UDAS unit identified by its serial number.

See Chapter 1, *Introduction to the Visual Designer Blocks* for detailed information on using the UDAS Devices dialog.

Channel Parameters

In the Channel Parameters section of the *uAnalogInputHS Parameters* dialog, use the drop-down lists to select the gain and range. Use the radio buttons to select the input configuration.

Last Channel to Read

To change the panel and channel number of the last item to be read by the process, click on the down arrow to open the drop-down list and make a selection.

The first channel is fixed at panel 0, channel 0 (the first channel on the UDAS unit or the first channel on the AI-MAX channel expansion system, if present). All channels in the selected input *Configuration* between the first and last channel (inclusive), are read.

Refer to your hardware manual for proper cabling and termination of the analog input signals.

Gain

To select a gain for all channels to read during the process, use the Gain drop-down list and make a selection.

Range

To select the range for all channels read during the process, use the Range drop-down list and make a selection.

Configuration

Select the Single-Ended or Differential configuration for the analog input signals that you want to read by clicking on the appropriate radio button.

Refer to the hardware manual for proper cabling and termination of the analog input signals.

Buffer Parameters

To determine the size of the VoltsData and/or CountsData output of the block, use the value in the *Samples Returned each Cycle* parameter.

This parameter defines the number of samples from each channel that are read in either buffer.

The Total Size of Acquisition parameter defines the size of the buffer used during the acquisition to receive data samples sent to the computer through the USB from the UDAS unit.

The Post-trigger Samples parameter selects the number of samples acquired from each channel after the trigger signal is detected in a trigger process.

Samples Returned Each Cycle

To specify the size of the output VoltsData and/or CountsData buffer, use this parameter. The number of samples acquired from each channel and output from the block is set based on this value.

Post-trigger Samples

This parameter specifies the number of samples to acquire from each channel after a trigger signal is activated and before ending a process. When the UDAS unit detects a trigger signal, a counter starts. When the specified number of samples from each channel is acquired, the process stops. To restart the counter, another trigger is required.

Total Size of Acquisition

In Frame Mode, the Total Size of Acquisition parameter specifies the number of samples acquired from each of the channels before the process is restarted. If a trigger mode is used, this is the number of samples acquired before a second trigger is required to restart the process. The amount of available memory on your system determines the maximum amount of buffer space.

In *Continuous Mode*, the Total Size of Acquisition parameter specifies the size of the buffer used to receive analog input data from the UDAS unit. It specifies the amount of buffering of input data that can occur before data is lost because the buffer space is full.

Pacer Parameters

This is the portion of the dialog where the pacer parameters for the high-speed process are defined. A pacer defines the timing signal that determines the sampling rate.

The pacer source initiates the A/D conversions and can originate from an internal rate generator, or from an external TTL signal.

Pacer Source

To select the type of pacer, use this drop-down list and select either Rate Generator or External. If using customized hardware, select *None*.

Rate

To set the per channel sample rate for the high-speed process, use the *Rate* parameter. Each channel in the list will be read at this rate.

If the on-board rate generator is selected as the pacer, the per channel sample rate will automatically be corrected to the closest rate possible (less than or equal to the entered rate) for the UDAS unit that is selected.

Trigger Parameters

Use this section of the dialog to define the Trigger Parameters for the high-speed process. The trigger source can originate from an analog input channel or from an external TTL signal.

Trigger Source

Select a starting trigger from this drop-down list (None, Analog Input, or External).
If you do not select a trigger, the high-speed process will be automatically started under software control as soon as the block executes.

> Note: In Frame Mode, a new trigger event is required for each data frame acquired when a trigger is used. In Continuous Mode, only a single trigger event is required. Once it occurs, data is acquired and continuously output until you manually stop the process.

For proper termination for an external or analog trigger signal, refer to the appropriate hardware manual.

Trigger Channel

When the Analog Input trigger is selected, this drop-down list is enabled. It allows any of the analog input channels that are to be acquired to act as a trigger source.

See the remarks section for important information on output channel ordering in this configuration.

Trigger Voltage

This field is enabled when Analog Input triggering is selected. It defines the voltage value to set for the trigger level.

Slope

This field is enabled for Analog Input and External triggering. It defines whether the selected trigger signal passing the threshold in the positive (rising), or negative (falling), direction constitutes a trigger.

Acquisition Mode

Use the Acquisition Mode to define the application's transfer mode, *Frame* or *Continuous*.

For digital scope applications, use *Frame Mode*. In *Frame Mode*, the high-speed process restarts each time a new frame of data is acquired.

For high-speed disk streaming applications, use *Continuous Mode*. In *Continuous Mode*, the high-speed process is started only once and executes until you manually stop the process.

For more information, see the Remarks section.

2.3.3 Remarks

Displaying Actual Counts Data

To display the raw counts data acquired by the **uAnalogInputHS** block, (using a Visual Designer **Display** block), pass the CountsData output of the block through a **Type Conversion** block and enable the *Strip weights and offsets* option of the **Type Conversion** block. The **Display** block normally applies the weight and offset to the counts data, displaying voltage instead of counts.

To change the units of the CountsData output from volts to another type of unit, pass the counts data through a **Modified Units** block.

Differences Between Frame Mode and Continuous Mode

In Frame Mode, the high-speed process restarts each time the previous frame is completed. The block acquires the specified number of samples, and the high-speed process stops. The FlowGram continues to the next block. The next time the block executes, the block is restarted.

In Continuous mode, the high-speed process starts when the block executes for the first time. When the specified number of output samples is acquired, the FlowGram continues to the next block, while the high-speed process continues to run. When the **uAnalogInputHS** block executes again, it outputs the oldest block of data in its internal buffer. This process continues until the FlowGram is stopped.

Analog Triggering

When analog triggering is used with the **uAnalogInputHS** block, the analog trigger channel is always the first channel in the VoltsData and/or CountsData output buffer. If Panel 0, Channel 3 is the last channel to be read and Panel 0, Channel 2 is the analog trigger channel selected, the output buffers will be formatted as follows:

Panel 0, Channel 2 data
Panel 0, Channel 3 data
Panel 0, Channel 0 data
Panel 0, Channel 1 data

Panel 0, Channel 2 data
Panel 0, Channel 3 data
Panel 0, Channel 0 data
Panel 0, Channel 1 data
and so forth.

Buffer Parameters for Continuous Mode

For the best performance, set the *Samples Returned Each Cycle* value (or the OutputSamples input value) to a value that is 1/8th the size of the *Total Size of Acquisition* value. This provides a reasonable sized buffer, enabling the disk streaming application to run at 100kHz without overruns occurring. For high-speed disk streaming applications, use the **uAnalogInputHS** block *CountsData* output.

2.4 uThermocoupleConversion Block

2.4.1 Description

The Visual Designer **uThermocoupleConversion** block converts analog input counts readings, based on a specified gain, range, and thermocouple type, into temperature values. The **uThermocoupleConversion** block supports J, K, and T type thermocouples, including cold-junction compensation (CJC). It also supports the Intelligent Instrumentation 5B37 series of isolated thermocouple input blocks.

The **uThermocoupleConversion** block has one optional input, one CJC channel number, and three outputs.

Inputs: Optional Inputs

CountsData

This Integer, Unsigned Integer, Floating Point, or Double Precision Floating Point input buffer contains the analog input readings, returned by the CountsData output of the **uAnalogInput** or **uAnalogInputHS** block.

When floating point inputs are used, their values are rounded to the nearest integer before being converted to temperature values.

CJCChannelNumber

This Integer or Unsigned Integer input buffer contains a single value indicating which of the channels in the CountsData input contains the cold-junction compensation (CJC) data for the other channels.

For example, if the first channel in CountsData is connected to the CJC circuit, the correct value for the CJCChannelNumber input would be zero.

> Note: The CJCChannelNumber is interpreted relative to the number of channels in the data input buffer, not as the actual channel number of the CJC circuit.

For example, if the CountsData input contained data from channels 0, 3, 4, and 7 and the CJC channel was 7, the correct value for the CJCChannelNumber would be 3, as the fourth input channel contains the data.

When 5B37 thermocouples are used, the CJC compensation is directly applied to the channel's reading. Since there is no CJC channel in this example, this input should not be connected.

Outputs

TemperatureData

This output is a multi-dimension Floating Point data buffer that contains the temperature data.

For standard thermocouple types, there is one less channel of data in the output than in the input (since the CJC data is not output).

For 5B37 thermocouples, the number of channels in the input and output are the same because there is no CJC channel in that configuration.

TCVoltageOutOfRange

This is a multi-dimension Boolean output, indicating any invalid thermocouple data in the CountsData input. When TRUE, it indicates the TC (thermocouple voltage) is out of range. This indicates that the thermocouple is damaged or the termination panel connections are incorrect.

CJCVoltageOutOfRange

This single-dimension Boolean output, indicating any invalid cold junction data in the CJC compensation voltage CountsData input. When TRUE, it indicates the CJC compensation voltage was out of range.

This indicates that the CJC is damaged or the fuse on the termination panel is blown.

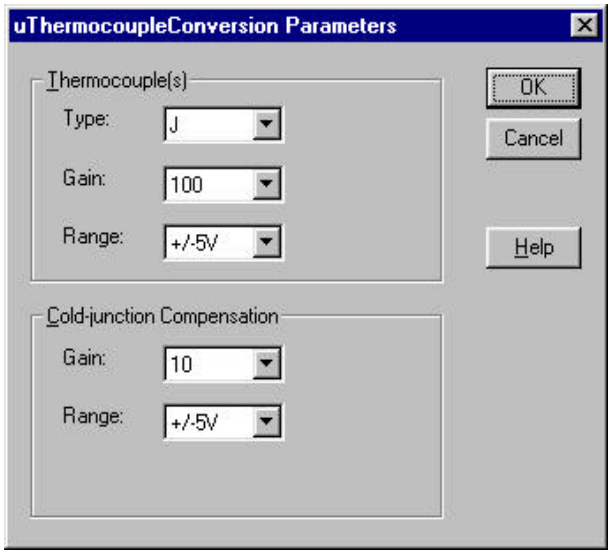

FIGURE 2.3 UDAS uThermocoupleConversion Parameters dialog

2.4.2 Parameters

The uThermocoupleConversion Parameters dialog is shown in FIGURE 2.3, *UDAS uThermocoupleConversion Parameters dialog*.

The uThermocoupleConversion Parameters dialog contains parameter settings for configuring the thermocouple type, gain, and range. For the Cold-junction Compensation channel, specify the gain and range

Thermocouple(s)

Type

To select the type, click the down arrow to open the drop-down list and select from the following types: J, K, T, J5B37, K5B37, and T5B37.

Gain

To select the gain at which the thermocouple readings were taken, click the down arrow to open the drop-down list and make a selection using the following information.

Based on the normal thermocouple range, type J, K, and T thermocouples should have their values read at a gain of 100.

The 5B37 thermocouple readings should be taken at a gain of 1.

Range

To select the range at which the thermocouple readings were taken, click the down arrow on the drop-down list and make a selection.

Based on the normal thermocouple ranges, the setting should be ±5 V.

Cold-junction Compensation

Gain

To select the gain used to read the CJC data values, click the down arrow to open the drop-down list and make a selection.

Based on the normal CJC range, the gain setting should be 10.

Range

To select the range at which the thermocouple readings were taken, click the down arrow to open the drop-down list and make a selection.

The CJC and Thermocouple ranges are normally set to the same value in this block and when analog input readings are taken.

> Note: This parameter is ignored for 5B37 thermocouples.

Chapter 3 UDAS Analog Output Function Blocks

3.1 Introduction to Analog Output Functions

This chapter contains the analog output function blocks found in the Blocks menu's USB sub-menu. These blocks support software or hardware controlled analog output through the analog output hardware present on UDAS models. This chapter contains detailed descriptions of these blocks.

Block	Icon	Function Description
uAnalogOutput	uAnalogOutput 1	Generates analog output data from a UDAS unit under software control.
uAnalogOutputHS	uAnalogOutputHS 1	Generates analog output waveforms from a UDAS unit under hardware control.

TABLE 3.1 UDAS Analog Output Block Descriptions

3.2 uAnalogOutput Block

3.2.1 Description

The Visual Designer **uAnalogOutput** block writes analog output data to the specified UDAS unit under software control. Use the *uAnalogOutput Parameters* dialog to create a list of analog output channels to write. When the block executes, one sample for each channel in the list is taken by the block from its input and written to the selected hardware. If more than one channel is to be written, use the *Pack* block to combine the data for each channel.

The **uAnalogOutput** block has three optional inputs and one output that are described below.

Inputs: Optional Inputs

UnitName

This string input provides an optional method of selecting a UDAS unit that is used to write the analog output data, after a list of units has been set up using the block's UDAS Devices dialog. If this input is connected, it overrides the USB parameter in the *uAnalogOutput Parameter* dialog.

VoltsData

This input contains the data to write to each channel in volts. The data type used for each dimension or channel of the VoltsData buffer must be either Floating Point, or Double Precision Floating Point.

CountsData

This input contains the data to write to each channel in common-format counts. The voltage range of the output determines the meaning of these values. For the UDAS units, use an Integer type for the input with a full-scale value of 32767 (+10 V), and a negative full-scale value of -32768 (-10V). The input data type must be Integer.

Outputs

Status

The Status output is a single-dimension, Long Integer data buffer that represents the status of the block. The status bits are set using any combination of the following:

The letter **h** represents hexidecimal notation. The letter **d** represents decimal notation.

USB_LINK (80000000h / -2147483648d) indicates the UDAS unit is open and operating correctly.

USB_ADDRESS_INVALID (00000002h / 2d) indicates the unit name specified in the uAnalogInput block's parameter dialog or through the UnitName input is unknown. The name was not entered in the *UDAS Devices* dialog.

USB_OPEN_FAILURE (00000001h / 1d) indicates that opening the unit failed. This error occurs if an application is trying to use a UDAS unit already in use by another block. Only one application may have a UDAS unit open at a time.

3.2.2 Parameters

The *uAnalogOutput Parameters* dialog is shown in FIGURE 3.1, *uAnalogOutput Parameters dialog*. List items can be added to or deleted from the channel list located in the upper portion of this dialog. The Channel Parameters section of the dialog is used to select the channel and range for each item in the channel list. The current channel parameters for the selected item in the channel list are displayed in the dialog. If any of the channel parameters are changed, the currently selected list item is automatically updated to reflect the changes.

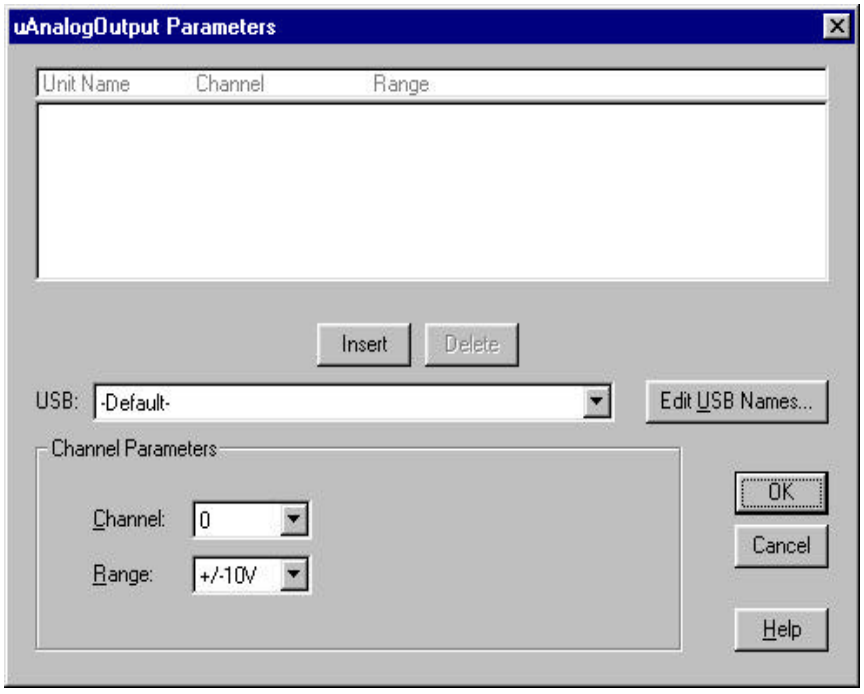

FIGURE 3.1 uAnalogOutput Parameters dialog

Channel List

This list is located in the upper portion of the dialog and contains the inserted channels for the selected UDAS unit. Click the *Insert* button to add items to this list.

To remove an item from this list, select the list item and click the *Delete* button.

For the FlowGram to compile and function properly, there must be at least one defined channel in the Channel List.

Insert

To add a new channel to the Channel List, click the *Insert* button. The new channel item is inserted directly below the currently selected item in the list.

The new channel item has the same channel parameters as the currently selected channel, except for the channel number which automatically increments by one.

Delete

To remove a channel item from the channel list, select the channel in the list and click the *Delete* button.

USB

This field has a drop-down list that contains the names of the UDAS units that have names assigned to them by serial number in the UDAS Devices dialog.

Edit USB Names

Click this button to open the UDAS Devices dialog (shown in Chapter 1, *Introduction to the Visual Designer Blocks*, FIGURE 1.1, *UDAS Devices dialog*) to edit UDAS unit names.

Channel Parameters

Use this section of the dialog to select a specific channel and range for the selected UDAS unit.

Channel

Click the down-arrow in this field to open the drop-down list and change the channel number of the currently selected channel in the Channel List.

Refer to the hardware manual for proper cabling and termination of the analog output signal that you want to write.

Range

Click the down-arrow in this field to select the range for the analog output signal that you want to write.

3.3 uAnalogOutputHS Block

3.3.1 Description

The **uAnalogOutputHS** block generates an analog output waveform using one or both analog output channels on a UDAS unit. The *uAnalogOutputHS Parameters* dialog (shown in FIGURE 3.2, *UDAS uAnalogOutputHS Parameters dialog*) enables you to select the channels to use, the process pacer, and the trigger sources. If more than one channel is written, the *Pack* block can be used to combine the data for each channel.

The **uAnalogOutputHS** block has two outputs, four optional inputs, and one required input and two outputs that are described below.

Inputs: Required Inputs

NewData

This is a single-channel Boolean input buffer used to indicate to the block that a new waveform is to be generated. When the input value is TRUE, the pacer is disabled, the process is stopped, new data from the VoltsData or CountsData input is programmed into the UDAS unit, and the process is restarted.

Optional Inputs

UnitName

This string input offers an optional method of selecting a unit to use for the output process, assuming that a list of units has been set up through the block's UDAS Devices dialog. If this input is connected, it overrides the USB parameter in the block's parameter dialog.

VoltsData

This input contains the data to write to each channel in volts. The data type for each dimension or channel must be either Floating Point or Double Precision Floating Point.

CountsData

This input contains the data to write to each channel in common format counts. The voltage range of the output determines the meaning of the count data values.

For the input on all UDAS units, use type Integer with a full-scale value of 32767 (+10V), and a negative full-scale value of -32768 (-10V).

SampleRate

This input contains a Floating Point value indicating the desired per-channel sample rate to use for the output process.

If the on-board Rate Generator is being used as the pacer source, a change in the value of this input causes the process to be stopped, the Rate Generator channel to be re-configured, and the process to be restarted.

Outputs

Status

The Status output is a single-dimension, Long Integer data buffer that represents the status of the block. The status bits are set using any combination of the following:

The letter **h** represents hexidecimal notation. The letter **d** represents decimal notation.

USB_LINK (80000000h / -2147483648d) indicates the UDAS unit is open and operating correctly.

USB_ADDRESS_INVALID (00000002h / 2d) indicates the unit name specified in the **uAnalogInput** block's parameter dialog or through the UnitName input is unknown. The name was not entered in the *UDAS Devices* dialog.

USB_OPEN_FAILURE (00000001h / 1d) indicates that opening the unit failed. If an application is trying to use a UDAS unit already in use by another block. Only one application may have a UDAS unit open at a time.

Overrun

This is a single-dimension, Boolean data buffer with its single value set to TRUE when an overrun error is detected in the output process. When TRUE is output, the output waveform is likely to have been corrupted.

This indicates that the pacer rate should be reduced.

Parameters

The *uAnalogOutputHS Parameters* dialog, FIGURE 3.2, *UDAS uAnalogOutputHS Parameters dialog*, contains several parameter groups. Use this dialog to select a UDAS unit for the output process, channel to be used, the process pacer, and the process trigger.

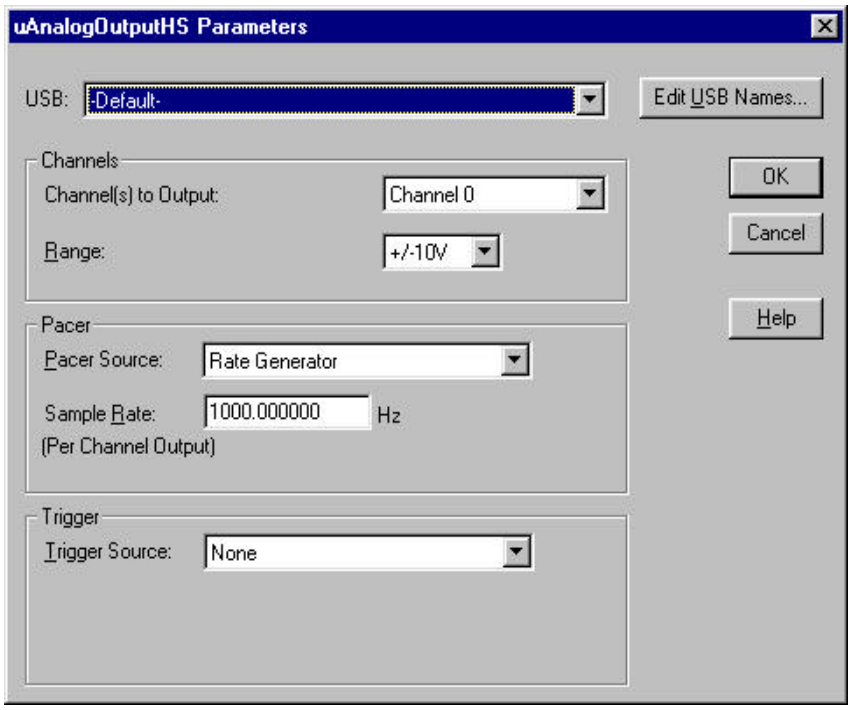

FIGURE 3.2 UDAS uAnalogOutputHS Parameters dialog

USB

To select the UDAS unit to be used, click the drop-down arrow to open the list.

Edit USB Names

Click this button to open the UDAS Devices dialog (see Chapter 1, *Introduction to the Visual Designer Blocks*, FIGURE 1.1, *UDAS Devices dialog* for more information on this dialog) to edit UDAS unit names.

Channels

Channels to Output

To select a single channel from the selected UDAS unit to output (0 or 1), or to select both channels, click the down arrow to open the drop-down list and make a selection.

Refer to the hardware manual for proper cabling and termination of the analog output signals.

Range

To select the range for the analog output channel(s) that you want to write, click the down arrow to open the drop-down list and make a selection.

Pacer

The pacer signal determines the rate at which new data values are written to the analog output channels on the UDAS unit.

Each time the pacer ticks, a new value is written to the output channel or to both channels.

Pacer Source

To select the source of the pacing signals for the process, click the down arrow to open the drop-down list and make a selection.

Sample Rate

If using a Rate Generator as the pacer source, use this field to enter the desired Rate Generator rate.

This field is ignored for other pacer sources.

Trigger

The trigger signal determines when output of the waveform actually begins.

When NewData input is set to TRUE, the default trigger, *None*, causes the waveform output to immediately start.

The Synchronized with Analog Input trigger allows the analog output in a stimulus/response test system to begin when the input process starts.

Trigger Source

To select the source of the trigger signal for the process, open the Trigger Source drop-down list and make a selection. When you select *None*, the process starts generating the waveform as soon as the NewData input's value is TRUE. When you select *Synchronized with Analog Input*, the waveform is generated when a corresponding analog input process on the same UDAS unit is initiated.

To use this feature, arrange the FlowGram to execute the **uAnalogOutputHS** block before the **uAnalogInputHS** block that will acquire the data.

A trigger may be set for the **uAnalogInputHS** block. When the analog input trigger activates, or if there is no analog input trigger selected, the process starts.

Chapter 4 UDAS Counter Function Blocks

4.1 Introduction to Counter Functions

This chapter describes the counter function block found in the Blocks menu's USB sub-menu. This block supports counter functions and signal measurement on all UDAS models. This chapter contains detailed descriptions of this block.

Block	Icon	Function Description
uCounter		Allows acquisition of event counts, measurement of frequency, pulse width and period from a UDAS unit under software control.

TABLE 4.1 UDAS Counter Block Descriptions

4.2 uCounter Block

4.2.1 Description

The **uCounter** block reads counter data or performs signal measurements using the hardware counter channel on a UDAS unit.

The current event counter value is read when the block executes, or a signal measurement process is performed on the selected UDAS unit, and the data is output by the block.

The **uCounter** block has three optional inputs and two outputs that are described below.

Inputs: Optional Inputs

UnitName

Use this string input as an optional method of selecting a unit. To assign names to the UDAS units, use the UDAS Devices dialog.

When this input is connected, it overrides the USB field in the *uCounter Parameter* dialog.

Enable

The Boolean *Enable* input controls the enabling of an event counter or a signal measurement process when the block executes.

When the input value is FALSE, the event counter is disabled. There are no events counted and the count value will not change from cycle to cycle of the FlowGram. If a signal measurement operation is configured it is not performed when Enable is FALSE.

Reset

The Boolean *Reset* input controls whether the event counter is reset when the **uCounter** block executes.

For a FALSE input value, the counter is not reset.

For a TRUE input value, the counter is reset to zero when the count value is read.

The *Reset* input is ignored for signal measurement modes.

Outputs

ChannelData

This is a single-channel buffer containing the counter data.

When the counter is configured for event counter mode, the data type of the output is Unsigned Long.

When the counter is configured for a signal measurement mode, the data type of the output is Double Precision Floating Point.

4.2.2 Parameters

The *uCounter Parameters* dialog is shown in FIGURE 4.1, *UDAS uCounter Parameters dialog*.

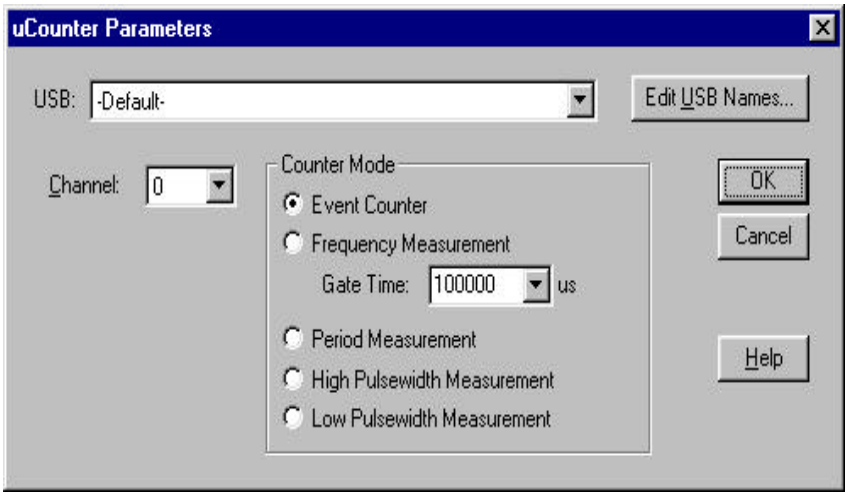

FIGURE 4.1 UDAS uCounter Parameters dialog

USB

This field has a drop-down list that contains the names of the UDAS units that have names assigned to them by serial number in the UDAS Devices dialog.

Edit USB Names

To edit an existing UDAS unit name, or to assign a name to a new UDAS unit (identified by serial number), click this button to open the UDAS Devices dialog. See Chapter 1, *Introduction to the Visual Designer Blocks* for information about the UDAS Devices dialog.

Channel

To select the counter channel number to use on the selected UDAS unit, in the Channel field, click the down arrow to open the drop-down list and make a selection.

The UDAS units have only one channel currently available, channel 0.

Count Mode Parameters

The Counter Mode section of the dialog allows the selection of the mode for configuring the counter channel. It may be necessary to include additional data for the modes.

Event Counter

To count the number of transitions on the counter input line, select this mode. The block outputs an Unsigned Long value indicating the current count.

Frequency Measurements

To measure the frequency of the input signal, select this mode.

The output of the block is the frequency value in Hertz. Double Precision Floating Point is the output data type.

When this mode is selected, specify the gate time (the period of time in which the number of transitions of the input signal are counted to determine the frequency). Enter the value (in microseconds) into the Gate Time field, or click the down arrow and use the drop-down list of standard values.

Period Measurement

To measure the period of the input signal, select this mode. The output of the block is the period value in Seconds.

Double Precision Floating Point is the output data type. In this mode, a high-speed on-board clock counts the period of the input signal to determine the length of the period.

High Pulsewidth Measurement

To measure the period of the high portion of the input signal, select this mode.

The output of the block is the period value in Seconds.

Double Precision Floating Point is the output data type. In this mode, a high-speed on-board clock counts the amount of time the input signal is in its high state to determine the length of the period.

Low Pulsewidth Measurement

To measure the period of the low portion of the input signal. The output of the block is measured in Seconds.

Double Precision Floating Point is the output data type. In this mode, a high-speed on-board clock counts the amount of time the input signal is in its low state to determine the length of the period.

Chapter 5 UDAS Digital Input Function Blocks

5.1 Introduction to Digital Input Functions

This chapter contains the digital input function blocks found in the Blocks menu's USB sub-menu. These blocks support port-wide functions and bit-wide digital input operations on all models of UDAS units. This chapter contains detailed descriptions of the blocks.

Block	Icon	Function Description
uDigitalInput		Acquires digital input port data from a UDAS unit under software control.
uDigitalInputBit		Acquires data from a digital input port (where each port bit can be configured), of a UDAS unit under software control.

TABLE 5.1 UDAS Counter Block Descriptions

5.2 uDigitalInput Block

5.2.1 Description

The Visual Designer **uDigitalInput** block reads digital input ports under software control. When the block executes, one sample from each port in the block's port list is read from the selected UDAS hardware and output by the block.

This block can read multiple ports on any UDAS unit with digital input capability. The desired ports are selected in the block's parameter dialog. If more than one port is read, the Visual Designer **Unpack** block can be used to separate the data for each port.

The **uDigitalInput** block has one optional input and two outputs are described below.

Inputs: Optional Inputs

UnitName

After a list of units has been set up by using the UDAS Devices dialog, use this string input as an optional method of selecting a unit to use for the operation.

When this input is connected, it overrides the USB field in the *uDigitalInput Parameter* dialog.

Outputs

PortData

The PortData output is an Unsigned Integer single-dimensional or multi-dimensional data buffer, depending on the number of ports in the list.

The digital input data is output as a 16-bit Unsigned Integer value. The upper 8 bits of each sample are always 0.

5.2.2 Parameters

The *uDigitalInput Parameters* dialog is shown in FIGURE 5.1, *UDAS uDigitalInput Parameters dialog*. The upper portion of this dialog contains the Port List. Use the *Insert* or *Delete* buttons to insert or delete ports from the list. The port parameter options correspond to the currently selected (highlighted) list item. If a port parameter is changed, the Port List is automatically updated with the changes.

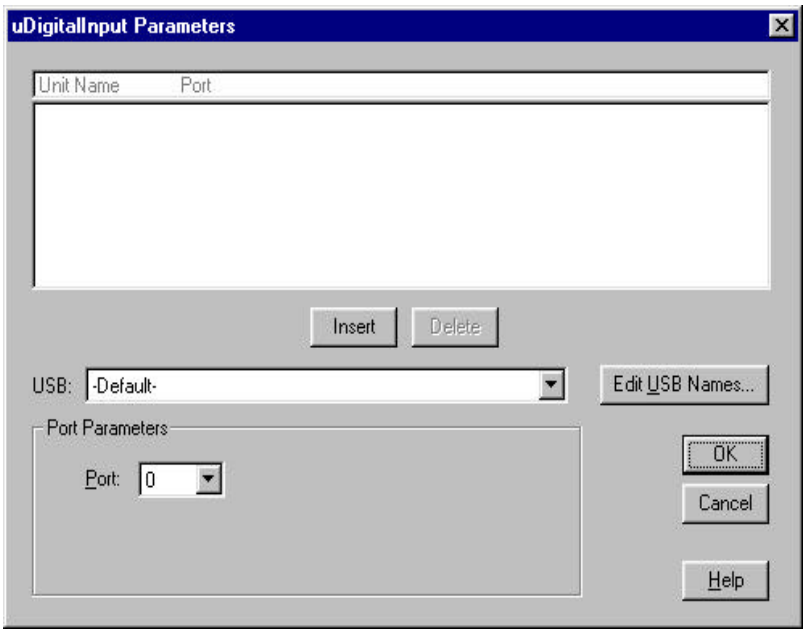

FIGURE 5.1 UDAS uDigitalInput Parameters dialog

Port List

Located in the upper section of the uDigitalInput dialog, this list contains entries for every inserted port. Use the *Insert* and *Delete* buttons to insert and delete items from this list.

Insert

To add a new port to the Port List, click the *Insert* button. The new port is added below the currently selected port in the list. If the item selected in the Port List is not using the highest port number on the chosen UDAS unit, the port number is incremented and assigned to the newly inserted item. To add a new item to the list, use the *Insert* key.

Delete

To remove an item from the Port List, select the item and click the *Delete* button or press the *Delete* key.

USB

Click the drop-down list in this field to select the names of the UDAS units that were assigned to them in the UDAS Devices dialog.

Edit USB Names

To assign a name to a UDAS unit (identified by its serial number), click the Edit USB Names button to open the UDAS Devices dialog (see Chapter 1, *Introduction to the Visual Designer Blocks* for more information on this dialog).

Port Parameters

This section of the dialog contains the Port field that has a drop-down list containing the available digital input ports. Click the down arrow to open the drop-down list and select a port.

5.3 uDigitalInputBit Block

Description

The **uDigitalInputBit** block reads one port of digital input data from the specified UDAS unit under software control. Each bit of the selected port can be individually configured for normal mode, or to count rising, falling, or both edges of an input signal. When the block executes, each of the port bits is read once and the data is output by the block.

Inputs: Optional Inputs

UnitName

After a list of units has been set up through the block's UDAS Devices dialog, use this string input as an optional method of selecting a unit.

When this input is connected, it overrides the current selection in the USB field in the *uDigitalInputBit Parameter* dialog.

Outputs

PortBit0Data through PortBit7Data

These eight outputs are single-dimension, Boolean or Unsigned Long data buffers, depending on the configuration mode selected for the port bit. For normal inputs, use Boolean. For counter inputs, use Unsigned Long.

5.3.1 Parameters

The *uDigitalInputBit Parameters* dialog is shown in FIGURE 5.2, *UDAS uDigitalInputBit Parameters*. This dialog contains a USB field that displays the UDAS units in the drop-down list.

The Port Parameters section of the dialog includes the Port field used to select the port number, the Port Bit Selection field, and the Port Bit Configuration field where each bit of the selected port can be individually configured. The **uDigitalInputBit** block has one optional input and has nine outputs.

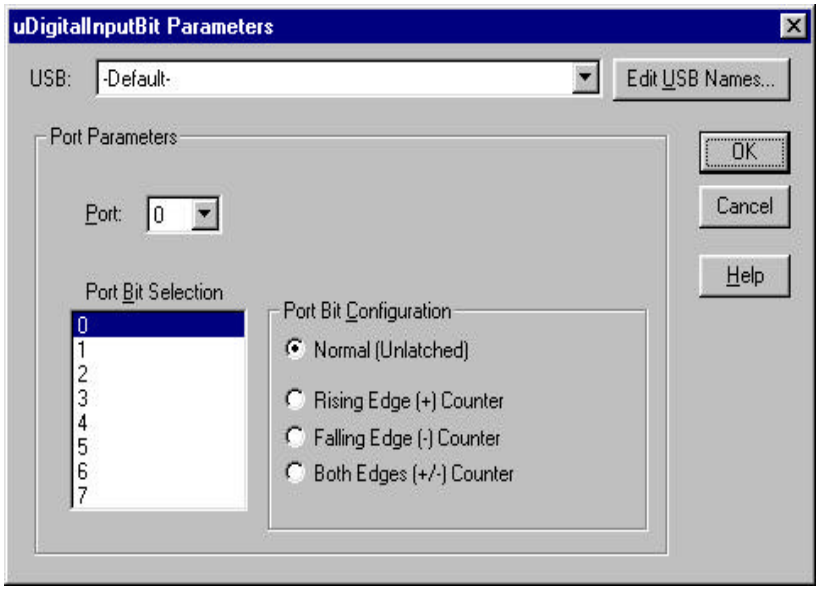

FIGURE 5.2 UDAS uDigitalInputBit Parameters

USB

Use this string input as an optional method of selecting a unit. Use the UDAS Devices dialog to assign names to the units.

Edit USB Names

To assign a name to a UDAS unit (identified by its serial number) or to edit an existing name, click this button to open the UDAS Devices dialog.

Port Parameters

Use this section of the dialog to select the port, the port bit, and the port bit mode.

Port

To select the port that contains the port bits that you want to read, click the down arrow to open the drop-down list and make a selection.

The block is configured to read only one port. To read a second port, select another **uDigitalInput Bit** block.

Port Bit Selection

Use this list to select the desired port bit that you want to configure. When you change the selected port bit in this list, the configuration option is automatically updated to reflect the status of the selected bit.

Port Bit Configuration

Select one of the four configuration options described below for your application.

Normal (Counter)

To monitor the state of a digital input port bit, click the radio button for this option.

The block outputs a Boolean value, indicating the current state of the port bit.

Rising-Edge (+) Counter

To count the number of times the input signal that is connected to the digital input bit changes state from 0 $\rightarrow$ 1, click the radio button for this option.

The output data type is Unsigned Long and represents the number of transitions since configuration of the bit.

Falling-Edge (-) Counter

To count the number of times the input signal that is connected to the digital input bit changes state from 1 $\rightarrow$ 0, click the radio button for this option.

Both Edges(+/-) Counter

To count the number of times the input signal that is connected to the digital input bit changes state, either from 0 $\rightarrow$ 1 or from 1 $\rightarrow$ 0. The output data type is Unsigned Long, representing the number of transitions since configuration of the bit.

Chapter 6 UDAS Digital Output Function Blocks

6.1 Introduction to Digital Output Functions

This chapter contains the digital output function block found in the Blocks menu's USB sub-menu. This block supports port-wide digital output operations on all models of UDAS units. This chapter contains a detailed description of the block.

Block	Icon	Function Description
uDigitalOutput	uDigitalOutput 1	Generates digital output port data from a UDAS unit under software control.

TABLE 6.1 UDAS Counter Block Descriptions

6.2 uDigitalOutput Block

6.2.1 Description

The Visual Designer **uDigitalOutput** block writes data to digital output ports under software control. When the block executes, one sample for each selected port is taken by the block from its input and written to the selected hardware.

The **uDigitalOutput** block has two optional inputs and one output as described below.

Inputs: Optional Inputs

UnitName

After a list of units is set up by using the UDAS Devices dialog, use this string input as an optional method of selecting a unit to use for the operation.

When this input is connected, it overrides the current entry in the USB field in the *uDigitalInput Parameter* dialog.

PortData

Depending on the number of ports in the port list, the PortData input is either a single-dimensional or a multi-dimensional data buffer that inputs the digital output data.

This input type can be Integer, Unsigned Integer, Character or Unsigned Character.

Outputs

Status

The Status output is a single-dimension, Long Integer data buffer that represents the status of the block. The status bits are set using any combination of the following:

The letter **h** represents hexidecimal notation. The letter **d** represents decimal notation.

USB_LINK (80000000h / -2147483648d) indicates the UDAS unit is open and operating correctly.

USB_ADDRESS_INVALID (00000002h / 2d) indicates the unit name specified in the block's parameter dialog or through the UnitName input is unknown. The name was not entered in the *UDAS Devices* dialog.

USB_OPEN_FAILURE (00000001h / 1d) indicates that opening the unit failed. This error occurs if an application is trying to use a UDAS unit already in use by another block. Only one application may have a UDAS unit open at a time.

6.2.2 Parameters

The *uDialogOutput Parameters* dialog is shown in FIGURE 6.1, *UDAS uDigitalOutput Parameters dialog*. The Port List is located in the upper portion of this dialog and uses the *Insert* and *Delete* buttons to insert or delete list items. The port parameter options apply to the list item that is currently selected.

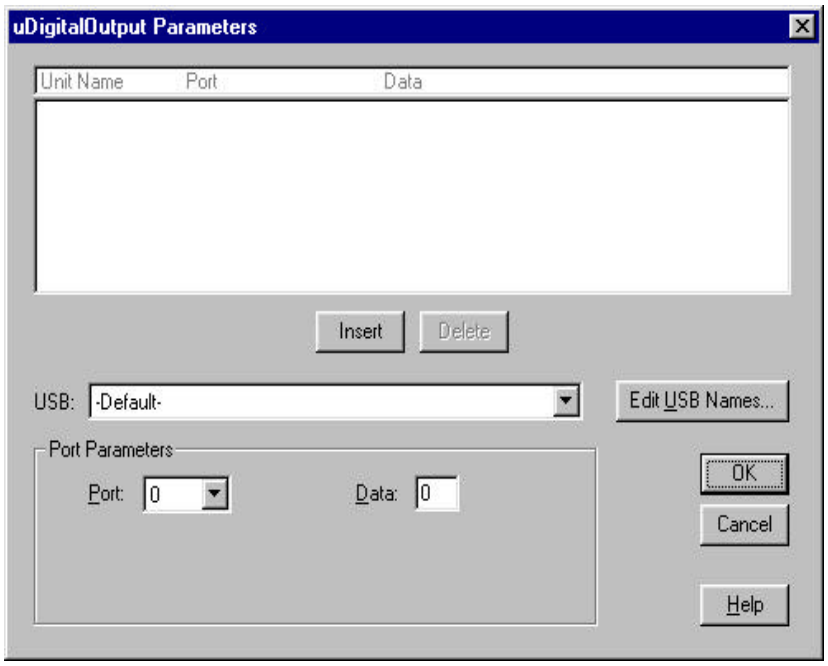

FIGURE 6.1 UDAS uDigitalOutput Parameters dialog

Port List

This list is located in the upper section of the *uDigitalOutput Parameters* dialog and contains an entry for every inserted port. List items are inserted and deleted from the list by use of the Insert and Delete buttons.

Insert

To add a new item to the Port List, click the Insert button. The new item appears below the item that is currently selected (highlighted).

If the currently selected item in the Port List is not using the highest port number, the port number is incremented and assigned to the next item in the list (new item).

The Insert key on the keyboard can also be used to insert items into the Port List.

Delete

To remove the currently selected port from the Port List, click the Delete button. Pressing the Delete key located on the keyboard also deletes the selected (highlighted) list item.

USB

Click the drop-down list in this field to select the names of the UDAS units that were assigned to them by serial number in the UDAS Devices dialog.

Edit USB Names

To assign a name to a UDAS unit (identified by its serial number), click the Edit UDAS Names button to display the UDAS Devices dialog. See Chapter 1, *Introduction to the Visual Designer Blocks* for more information on the UDAS Devices dialog.

Port Parameters

The Port field is located in this portion of the dialog which contains a list of the available digital input ports, and the Data field used to define the constant data value to be output by the port.

Port

To select an available digital input port for the currently selected item in the Port List, click the down arrow to open the drop-down list and make a selection.

Data

Use this field to define the data value to be output by the port for applications that require a constant data value to be output by the port.

To override this value at run time, use the block's PortData input.

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